**EXAMINER'S AMENDMENT**

1. The previous examiner's amendment dated 12/22/09 is hereby superseded by the examiner's amendment set forth below.

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Sanders Hillis on 03/24/10.

3. The application has been amended as follows:

21. (Currently Amended) A video encoding method comprising: dividing a coding target frame into a plurality of blocks, wherein each of the blocks corresponds to a predicted reference image to be generated; determining a motion vector for each of the blocks; extracting, for an operable block within the blocks, motion complexity information of the operable block ~~based upon the motion vector of the operable block and the motion vector of each of the blocks in the coding target frame that neighbor the operable block~~, wherein the <u>motion</u> complexity information of the operable block indicates a degree of complexity of movement between the operable block of the coding target frame and a corresponding block in a reference frame; determining, for the operable block, a number of funny position pixels to include in the predicted reference image to be generated for the operable block based upon the motion complexity information

of the operable block, wherein the determined number of funny position pixels included in the predicted reference image increases as the degree of complexity of movement of the operable block increases; ~~and~~ generating the predicted reference image for the operable block, wherein the predicted reference image for the operable block includes integer pixels located at integer pixel positions within the predicted reference image, interpolated pixels located at interpolated pixel positions within the predicted reference image, and the determined number of funny position pixels[[.]]; generating the predicted reference image corresponding to the coding target frame as a function of the motion vector determined for each of the blocks of the coding target frame; calculating a difference between the coding target frame and the predicted reference image for each of said blocks; converting the difference between the coding target frame and the predicted reference image for each of said blocks into a set of coefficients based upon a predetermined conversion rule; determining a number of non-zero coefficients in each set of coefficients for each of said blocks; and wherein extracting motion complexity information of the operable block comprises: determining a number of non-zero coefficients in the blocks that neighbor the operable block, wherein the motion complexity information of the operable block is based upon the number of non-zero coefficients in the blocks that neighbor the operable block.

22. (Previously Presented) The video encoding method of claim 21, wherein

the corresponding block in the reference frame includes a reference image, and wherein the reference image includes reference pixels located at integer pixel positions within the reference image, and wherein generating said predicted reference image for the operable block comprises: selecting pixel values of the reference pixels included in the reference image of the corresponding block as the pixel values of the integer pixels to include in the predicted reference image.

23. (Previously Presented) The video encoding method of claim 22, wherein generating the predicted reference image for the operable block further comprises: generating the interpolated pixels to include in the predicted reference image for the operable block, wherein the interpolated pixels are based upon the reference pixels included in the reference image of the corresponding block and reference pixels in reference images of blocks in the reference frame that neighbor the corresponding block in the reference frame.

24. (Currently Amended) The video encoder method of claim 23, wherein the interpolated pixels are generated with an interpolation algorithm, and for each of the <u>interpolated</u> ~~interpolator~~ pixels, the interpolator algorithm including a high-frequency cutoff characteristic; wherein the funny position pixels are generated with a low-pass filter, wherein the low-pass filter includes a high-frequency cutoff characteristic; and wherein for a respective funny position pixel of the funny position pixels, the high-frequency cutoff characteristic of the low-pass filter

used to generate the respective funny position pixel is less than the high-frequency cutoff characteristic of the interpolator algorithm used to generate the interpolated pixels that neighbor the respective funny position pixel.

25. (Cancelled)

26. (Currently Amended) The video encoding method of claim 21, wherein determining, for the operable block, the <u>determined</u> number of funny position pixels to include in the predicted reference image, further comprises: determining whether the degree of complexity of movement of the operable block exceeds a threshold; and in response to determination that the degree of complexity of movement of the operable block exceeds the threshold, selecting the determined number of funny position pixels to be greater than one.

27. (Cancelled)

28. (Cancelled)

29. (Previously Presented) The video encoding method of claim 21, wherein generating the predicted reference image for the operable block comprises: selecting pixel values of original pixels within the corresponding block in the reference frame as the pixel values of the integer pixels to include in the

predicted reference image for the operable block, wherein the pixel values of the original pixels selected as the pixel values of the integer pixels are unfiltered.

30. (Previously Presented) The video encoding method of claim 21, wherein generating the predicted reference image for the operable block further comprises: generating the determined number of funny position pixels, wherein each of the funny position pixels corresponds to one of a plurality of funny position locations within the predicted reference image, wherein each of the funny position locations corresponds to a set of low-pass filter coefficients, and wherein a pixel value for each of funny position pixels is generated based upon the set of low-pass filter coefficients corresponding to said one of the plurality of funny position locations.

31. (Currently Amended) The video encoding method of claim 30, wherein the determined number of funny pixels includes a funny <u>position</u> pixel located at a funny position location, and wherein generating the determined number of funny position pixels further comprises: calculating the pixel value for the funny position pixel based upon the integer pixels located in a horizontal line of pixels of the coding target frame that are spatially closest to the funny position location[[s]] of the funny position pixel.

32. (Currently Amended) A computer readable memory media comprising: the computer readable memory media including computer program code stored thereon, wherein the computer program code is executable on a processor, the computer program code including instructions to: divide a coding target frame into a plurality of blocks, wherein each of the blocks corresponds to a predicted reference image to be generated; determine a motion vector for each of the blocks; extract, for an operable block within the blocks, motion complexity information of the operable block ~~based upon the motion vector of the operable block and the motion vector of each of the blocks in the coding target frame that neighbor the operable block~~, wherein the motion complexity information of the operable block indicates a degree of complexity of movement between the operable block of the coding target frame and a corresponding block in a reference frame; determine, for the operable block, a number of funny position pixels to include in the predicted reference image to be generated for the operable block based upon the motion complexity information of the operable block, wherein the determined number of funny position pixels included in the predicted reference image increases as the degree of complexity of movement of the operable block increases; and generate the predicted reference image for the operable block, wherein the predicted reference image for the operable block includes integer pixels located at integer pixel positions within the predicted reference image, interpolated pixels located at interpolated pixel positions within the predicted reference image, and the determined number of funny position

pixels[[.]]; generate the predicted reference image corresponding to the coding target frame as a function of the motion vector determined for each of the blocks of the coding target frame; calculate a difference between the coding target frame and the predicted reference image for each of said blocks; convert the difference between the coding target frame and the predicted reference image for each of said blocks into a set of coefficients based upon a predetermined conversion rule; and wherein the instructions to extract the motion complexity information of the operable block comprises instructions to determine a number of non-zero coefficients in said blocks that neighbor the operable block, wherein the motion complexity information of the operable block is based upon the number of non-zero coefficients in said blocks that neighbor the operable block.

33. (Currently Amended) The computer readable memory media of claim 32, wherein instructions to generate said predicted reference image for the operable block comprises instructions to select pixel values of original pixels of the corresponding block in the reference frame as the pixel values of the integer pixels to include in the predicted reference image.

34. (Currently Amended) The computer readable memory media claim 32, further comprising instructions to: generate a predicted reference image corresponding to the coding target frame as a function of the motion vector determined for each of the blocks of the coding target frame; calculate a

difference between the coding target frame and the predicted reference image for each of said blocks; convert the difference between the coding target frame and the predicted reference image for each of said blocks into a set of coefficients based upon a predetermined conversion rule; determine the number of non-zero coefficients in each set of coefficients for each of said blocks; and determine a number of non-zero coefficients in said blocks that neighbor the operable block, wherein the complexity information of the operable block is based upon the number of non-zero coefficients.

35. (Currently Amended) The computer readable memory media of claim 32, wherein instructions to determine, for the operable block, the number of funny position pixels to include in the predicted reference image comprise instructions to: determine whether the degree of complexity of movement of the operable block exceeds a threshold; and in response to determination that the degree of complexity of movement of the operable block exceeds the threshold, select the determined number of funny position pixels to be greater than one.

36. (Currently Amended) The computer readable memory media of claim 32, wherein instructions to extract, for the operable block, the motion complexity information of the operable block comprise instructions to: calculate a differential motion vector for at least some of the blocks in the coding target frame that neighbor the operable block as a function of the motion vector of the operable

block and the motion vector of each of the blocks in the coding target frame that neighbor the operable block; and wherein the degree of complexity of movement is based upon at least some of the calculated differential motion vector for each of the blocks in the coding target frame that neighbor the operable block.

37. (Currently Amended) The computer readable memory media of claim 32, wherein instructions to generate the predicted reference image for the operable block comprise instructions to generate the determined number of funny position pixels, wherein each of the funny position pixels corresponds to one of a plurality of funny position locations within the predicted reference image, wherein each of the funny position locations corresponds to a set of low-pass filter coefficients, and wherein a pixel value for each of funny position pixels is generated based upon the set of low-pass filter coefficients corresponding to said one of the plurality of funny position locations.

38. (Currently Amended) A video decoding method comprising: dividing a decoding target frame into a plurality of blocks, wherein each of the blocks corresponds to a predicted reference image to be generated; decoding a compressed data stream to generate a motion vector for an operable block and a motion vector for each of the blocks in the decoding target frame that surround the operable block in the decoding target frame; extracting, for an

operable block within the blocks, motion complexity information of the operable block ~~based upon the motion vector of the operable block and the motion vector for each of the blocks in the decoding target frame that surround the operable block~~, wherein the complexity information of the operable block indicates a degree of complexity of movement between the operable block of the decoding target frame and a corresponding block in a reference frame; determining, for the operable block, a number of funny position pixels to include in the predicted reference image to be generated for the operable block based upon the motion complexity information of the operable block, wherein the number of funny position pixels included in the predicted reference image increases as the degree of complexity of movement of the operable block increases; ~~and~~ generating the predicted reference image for the operable block based upon ~~reference~~ integer pixels of the corresponding block in the reference frame, ~~the reference~~ integer pixels of blocks in the reference frame that surround the corresponding block, the motion vector of the operable block, and the motion vector of each of the blocks that surround the operable block in the decoding target frame, wherein the predicted reference image for the operable block includes integer pixels located at integer pixel positions within the predicted reference image, interpolated pixels located at interpolated pixel positions within the predicted reference image, and the determined number of funny position pixels[[.]]; generating the predicted reference image corresponding to the decoding target frame as a function of the motion vector determined for each of

the blocks of the decoding target frame; calculating a difference between the decoding target frame and the predicted reference image for each of said blocks; converting the difference between the decoding target frame and the predicted reference image for each of said blocks into a set of coefficients based upon a predetermined conversion rule; and wherein extracting motion complexity information of the operable block comprises: determining a number of non-zero coefficients in said blocks that neighbor the operable block, wherein the complexity information of the operable block is based upon the number of non-zero coefficients in said blocks that neighbor the operable block.

39. (Currently Amended) The video decoding method of claim 38, wherein generating the predicted reference image for the operable block further comprises: generating the interpolated pixels to include in the predicted reference image for the operable block, wherein the interpolated pixels are based upon the reference pixels of the corresponding block in the reference frame and reference pixels of blocks in the reference frame that surround the corresponding block.

40. (Previously Presented) The video decoder method of claim 38, wherein the interpolated pixels are generated with an interpolation algorithm, and for each of the interpolator pixels, the interpolator algorithm including a high-frequency cutoff characteristic; wherein the funny position pixels are generated

with a low-pass filter, wherein the low-pass filter includes a high-frequency cutoff characteristic; and wherein for a respective funny position pixel of the funny position pixels, the high-frequency cutoff characteristic of the low-pass filter used to generate the respective funny position pixel is less than the high-frequency cutoff characteristic of the interpolator algorithm used to generate the interpolated pixels that neighbor the respective funny position pixel.

41. (Cancelled)

42. (Currently Amended) The video decoding method of claim 38, wherein determining, for the operable block, the number of funny position pixels to include in the predicted reference image, further comprises: determining whether the degree of complexity of movement of the operable block exceeds a threshold; and in response to determination that the degree of complexity of movement of the operable block exceeds the threshold, selecting the determined number of funny position pixels to be greater than one.

43. (Currently Amended)

44. (Previously Presented) The video decoding method of claim 38, wherein generating the predicted reference image for the operable block further comprises: generating the determined number of funny position pixels, wherein

each of the funny position pixels corresponds to one of a plurality of funny position locations within the predicted image, wherein each of the funny position locations corresponds to a set of low-pass filter coefficients, and wherein a pixel value for each of funny position pixels is generated based upon the set of low-pass filter coefficients corresponding to said one of the plurality of funny position locations.

45. (Previously Presented) The video decoding method of claim 44, wherein the determined number of funny pixels includes a funny pixel located at a funny position location, and wherein generating the determined number of funny position pixels further comprises: calculating the pixel value for the funny position pixel based upon the integer pixels located in a horizontal line of pixels of the decoding target frame that are spatially closest to the funny position locations of the funny position pixel.

46. (Currently Amended) A ~~tangible~~ computer readable memory media comprising: the computer readable memory media including computer program code stored thereon, wherein the computer program code is executable on a processor, the computer program code including instructions to implement the method according to claim 38.

47. (Currently Amended) A computing system comprising: ~~a storage medium~~

a computer readable memory media including stored therein a plurality of executable instructions; and a[[n]] processor coupled to the ~~storage medium~~ computer readable memory media, the processor configured to execute at least a subset of the plurality of executable instructions to implement a method according to claim 38.

48. (Cancelled)

***Allowable Subject Matter***

4. Claims 21-24, 26, 29, 30-31, 32-40, 42, and 44-47 are allowed.

The following is an examiner's statement of reasons for allowance: The cited prior art fails to teach the applicant's claimed invention as follows: blocks corresponds to a predicted reference image to be generated; determining a motion vector for each of the blocks; extracting, for an operable block within the blocks, motion complexity information of the operable block, wherein the motion complexity information of the operable block indicates a degree of complexity of movement between the operable block of the coding target frame and a corresponding block in a reference frame; determining, for the operable block, a number of funny position pixels to include in the predicted reference image to be generated for the operable block based upon the motion complexity information of the operable block, wherein the determined number of funny position pixels included in the predicted reference image

increases as the degree of complexity of movement of the operable block increases; generating the predicted reference image for the operable block, wherein the predicted reference image for the operable block includes integer pixels located at integer pixel positions within the predicted reference image, interpolated pixels located at interpolated pixel positions within the predicted reference image, and the determined number of funny position pixels; generating the predicted reference image corresponding to the coding target frame as a function of the motion vector determined for each of the blocks of the coding target frame; calculating a difference between the coding target frame and the predicted reference image for each of said blocks; converting the difference between the coding target frame and the predicted reference image for each of said blocks into a set of coefficients based upon a predetermined conversion rule; determining a number of non-zero coefficients in each set of coefficients for each of said blocks; and wherein extracting motion complexity information of the operable block comprises: determining a number of non-zero coefficients in the blocks that neighbor the operable block, wherein the motion complexity information of the operable block is based upon the number of non-zero coefficients in the blocks that neighbor the operable block.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANNER HOLDER whose telephone number is (571)270-1549. The examiner can normally be reached on M-W, M-W 8 am-3 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Mehrdad Dastouri can be reached on 571-272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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